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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/522,461	01/25/2005	Do-Young Jeong	1455-050205	7554

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EXAMINER	
WONG, EDNA	

ART UNIT	PAPER NUMBER
1753	

DATE MAILED: 07/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/522,461	JEONG ET AL.	
	Examiner	Art Unit	
	Edna Wong	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-12 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-12 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 25 January 2005 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date September 8, 2005.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Drawings

The drawings are objected to because the word "metastabl" in the ordinate of Fig. 4 should be amended to the word -- metastable --. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

I. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

The abstract of the disclosure is objected to because the word "said" is used in lines 3-7 and 9-12. Correction is required. See MPEP § 608.01(b).

II. The disclosure is objected to because of the following informalities:

page 3, line 28, the word "metastabe" should be amended to the word -- metastable --.

page 6, line 33, "Fig.4" should be amended to -- Fig. 4 --.

page 7, line 3, "Fig.5" should be amended to -- Fig. 5 --.

page 7, line 9, the word "stae" should be amended to the word -- state --.

page 7, line 13, "Fig.6" should be amended to -- Fig. 6 --.

page 7, line 21, "Fig.7" should be amended to -- Fig. 7 --.

Appropriate correction is required.

The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 112

Claims **3-9 and 11-12** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 3

line 1, "said pumping" lacks antecedent basis.

lines 4-5, it appears that "a metastable state at an energy of 7793 cm^{-1} relative to the zero energy of said ground state" is further limiting the metastable state recited in claim 1, line 12. However, it is unclear if it is. If it is not, then what is the relationship between the metastable state at an energy of 7793 cm^{-1} relative to the zero energy of said ground state and the metastable state recited in claim 1?

Claim 4

line 1, "said photon" (singular) lacks antecedent basis.

Claim 5

line 1, "said exciting step" lacks antecedent basis.

line 2, it appears that "an intermediate, resonant state" is further limiting the intermediate, resonant state as recited in claim 1, line 14. However, it is unclear if it is. If it is not, then what is the relationship between the intermediate, resonant state and the intermediate, resonant state recited in claim 1?

Claim 6

line 1, "said exciting step" lacks antecedent basis.

line 2, it appears that "an intermediate, resonant state" is further limiting the intermediate, resonant state as recited in claim 1, line 14. However, it is unclear if it is. If it is not, then what is the relationship between the intermediate, resonant state and the intermediate, resonant state recited in claim 1?

Claim 7

line 1, "said photon" (singular) lacks antecedent basis.

Claim 8

line 1, "said ionizing step" lacks antecedent basis.

line 3, "said second excited state" lacks antecedent basis.

lines 3-5, it appears that "continuum states at an energy range of 49266.7 cm^{-1} ~ 55000 cm^{-1} relative to the zero energy of said ground state" is further limiting the continuum states as recited in claim 1, line 15. However, it is unclear if they are. If they are not, then what is the relationship between the continuum states at an energy range of 49266.7 cm^{-1} ~ 55000 cm^{-1} relative to the zero energy of said ground state and the continuum states recited in claim 1?

Claim 9

line 1, "said ionizing step" lacks antecedent basis.

line 3, "said second excited state" lacks antecedent basis.

lines 3-5, it appears that "continuum states at an energy range of 49266.7 cm^{-1} ~ 55000 cm^{-1} relative to the zero energy of said ground state" is further limiting the continuum states as recited in claim 1, line 15. However, it is unclear if they are. If they are not, then what is the relationship between the continuum states at an energy range

of 49266.7 cm^{-1} ~ 55000 cm^{-1} relative to the zero energy of said ground state and the continuum states recited in claim 1?

Claim 11

line 1, "said exciting step" lacks antecedent basis.

line 2, it appears that "an intermediate, resonant state" is further limiting the intermediate, resonant state as recited in claim 1, line 14. However, it is unclear if it is. If it is not, then what is the relationship between the intermediate, resonant state and the intermediate, resonant state recited in claim 1?

Claim 12

line 1, "said exciting step" lacks antecedent basis.

line 2, it appears that "an intermediate, resonant state" is further limiting the intermediate, resonant state as recited in claim 6, line 2. However, it is unclear if it is. If it is not, then what is the relationship between the intermediate, resonant state and the intermediate, resonant state recited in claim 6?

line 2, it appears that "is performed by exciting the thallium atoms in the metastable state to a second excited state at an energy of 42011.4 cm^{-1} relative to the

zero energy of said ground state" is further limiting the is performed by exciting the thallium atoms in the metastable state to a second excited state at an energy of 42011.4 cm^{-1} relative to the zero energy of said ground state as recited in claim 6, lines 2-4. However, it is unclear if it is. If it is not, then what is the relationship between the is performed by exciting the thallium atoms in the metastable state to a second excited state at an energy of 42011.4 cm^{-1} relative to the zero energy of said ground state and the is performed by exciting the thallium atoms in the metastable state to a second excited state at an energy of 42011.4 cm^{-1} relative to the zero energy of said ground state recited in claim 6?

line 3, it appears that "a second excited state at an energy of 42011.4 cm^{-1} relative to the zero energy of said ground state" is the same as the second excited state at an energy of 42011.4 cm^{-1} relative to the zero energy of said ground state recited in claim 6, lines 3-4. However, it is unclear if it is. If it is not, then what is the relationship between the second excited state at an energy of 42011.4 cm^{-1} relative to the zero energy of said ground state and the second excited state at an energy of 42011.4 cm^{-1} relative to the zero energy of said ground state recited in claim 6?

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims **1-12** are rejected under 35 U.S.C. 103(a) as being unpatentable over **FR 2,790,974** ('974) in combination with **Eerkens** (US Patent No. 5,221,446).

FR '974 teaches a method for separating an isotope of thallium in an atomic vapor (d'une vapeur de thallium) containing a plurality of isotopes of thallium including said isotope (page 19, lines 16-20), said method comprising the steps of:

(a) producing photons of a first frequency (= une premiere frequence) by a laser system, wherein said first frequency is *about* 378 nm (= 377.7 nm) [page 19, lines 21-24; abstract; and Fig. 1];

(b) producing photons of a second frequency (= deuxieme frequence) by said laser system, wherein said second frequency is 352 nm (page 19, lines 25-28; abstract; and Fig. 1);

(c) producing photons of a third frequency (= troisieme frequence) by said laser system, wherein said third frequency is in the range of 700 nm to 1400 nm (= 850 nm) [page 19, lines 29-32; abstract; and Fig. 1];

(d) applying said photons of said first, second and third frequencies to said vapor of said thallium, wherein said photons of said first frequency pump (= pomper optiquement) [page 12, lines 13-16] isotope-selectively a plurality of ground state (= l'etat fundamental) thallium atoms through an excited state (= etat intermediaire quasi-resonant) into a metastable state (page 19, line 33 to page 20, line 8), and wherein said

photons of said second frequency excite a plurality of metastable state thallium atoms to an intermediate, resonant state (= deuxieme etat intermediaire) [page 20, lines 9-14], and wherein said photons of said third frequency
ionize a plurality of atoms in said intermediate, resonant state through continuum states (= un etat de Rydberg final) [page 20, lines 15-20; and Fig. 5]; and

(e) collecting said isotope ions (= recueillir ledit isotope thallium 203) [page 20, line 21].

The pumping is performed by applying said photons of said first frequency to pump optically (= pomper optiquement) [page 12, lines 13-16] and isotope-selectively said isotope of thallium from the ground state through a first excite state at an energy of 26477.6 cm^{-1} (= 26477.5) relative to the zero energy of said ground state into a metastable state at an energy of 7793 cm^{-1} (= 7792.7) relative to the zero energy of said ground state (page 20, lines 22-27; and Fig. 5).

The step of collecting said isotope ions comprises applying an electric field to said vapor (= appliquer un champ electrique a ladite vapeur de thallium) [page 6, line 31 to page 7, line 4; page 20, lines 28-31; and Figs. 2-4].

The method of FR '974 differs from the instant invention because FR '974 does not disclose the following:

a. Wherein said second frequency is about 292 nm, as recited in claim 1. FR '974 teaches a second frequency of 352 nm (page 19, lines 25-28; and Fig.

5).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the second frequency described by FR '974 with wherein said second frequency is about 292 nm because a 60 nm difference in frequency appears to be a mere optimization which solves no stated problems and produces no unexpected results, unless proven otherwise (MPEP § 2144.05 (II)).

b. Wherein said photon of said first frequency is produced by one or more *continuous wave lasers*, as recited claim 2.

c. Wherein said photon of said second frequency is produced by one or more *pulsed lasers*, as recited claim 4.

d. Wherein said photon of said third frequency is produced by one or more *pulsed lasers*, as recited in claim 7.

FR '974 teaches that the laser light **102** bisects the *color vapor* **107** (page 6, lines 16-21; and Fig. 1).

Like FR '974, Eerkens teaches laser isotope separation. Eerkens teaches that in the AVLIS approach, which is an abbreviation for Atomic Vapor Laser Isotope Separation, isotopic metal is vaporized (usually by means of electron guns) and the vapor is irradiated by two ultraviolet or three visible superimposed laser beams at two or three different wavelengths. *Dyes* are used to convert photons to certain visible frequencies required for three-step selective excitation and ionization of atoms (col. 1,

lines 38-55).

Lasers are pulsed so that different frequencies are absorbed at different times with time frames and intervals that range from nanoseconds to milliseconds. Only one (or two) continuous-wave (CW) laser beam(s) is (are) employed when no time gating is required (col. 2, lines 50-57).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the photon of the first, second and third frequencies described by FR '974 with wherein said photon of said first frequency is produced by one or more continuous wave lasers; wherein said photon of said second frequency is produced by one or more pulsed lasers; and wherein said photon of said third frequency is produced by one or more pulsed lasers because FR '674 teaches a dye laser (page 6, lines 16-21; and Fig. 1). Continuous wave lasers and pulsed lasers are conventional sources to pump dyes in dye lasers and have outputs capable of exciting a predetermined absorption line of species as taught by Eerkens (col. 2, lines 50-57).

e. Wherein said exciting step by the photons of the second frequency to an intermediate, resonant sate state is performed by exciting the thallium atoms in the metastable state to a second excited state at an energy of *42049.0 cm^{-1}* relative to the zero energy of said ground state, as recited in claim 5.

f. Wherein said exciting step by the photons of the second frequency to an

intermediate, resonant state is performed by exciting the thallium atoms in the metastable state to a second excited state at an energy of *42011.4 cm^{-1}* relative to the zero energy of said ground state, as recited in claim 6.

g. Wherein said exciting step by the photons of the second frequency to an intermediate, resonant state is performed by exciting the thallium atoms in the metastable state to a second excited state at an energy of *42011.4 cm^{-1}* relative to the zero energy of said ground state, as recited in claim 12.

h. Wherein said ionizing step by the photons of the third frequency is performed by applying said photons of said third frequency to ionize atoms in said second excited state at an energy of *42011.4 cm^{-1}* to continuum states at an energy range of *49266.7 cm^{-1} ~ 55000 cm^{-1}* relative to the zero energy of said ground state, as recited in claim 9.

i. Wherein said ionizing step by the photons of the third frequency is performed by applying said photons of said third frequency to ionize atoms in said second excited state at an energy of *42049.0 cm^{-1}* to continuum states at an energy range of *49266.7 cm^{-1} ~ 55000 cm^{-1}* relative to the zero energy of said ground state, as recited in claim 8.

j. Wherein said exciting step by the photons of the second frequency to an intermediate, resonant state is performed by exciting the thallium atoms in the metastable state to a second excited state at an energy of *42049.0 cm^{-1}* relative to the zero energy of said ground state, as recited in claim 11.

FR '974 teaches exciting the thallium atoms in the metastable state to a second excited state at an energy of *36199.9* relative to the zero energy of said ground state, and applying said photons of said third frequency to ionize atoms in said second excited state at an energy of 36199.9 to continuum states at an energy range of *49000* relative to the zero energy of said ground state (page 20, lines 22-27; and Fig. 5).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the exciting step described by FR '974 with wherein said exciting step by the photons of the second frequency to an intermediate, resonant sate state is performed by exciting the thallium atoms in the metastable state to a second excited state at an energy of 42049.0 cm^{-1} relative to the zero energy of said ground state; wherein said exciting step by the photons of the second frequency to an intermediate, resonant state is performed by exciting the thallium atoms in the metastable state to a second excited state at an energy of 42011.4 cm^{-1} relative to the zero energy of said ground state; wherein said ionizing step by the photons of the third frequency is performed by applying said photons of said third frequency to ionize atoms in said second excited state at an energy of 42011.4 cm^{-1} to continuum states at an energy range of 49266.7 cm^{-1} ~ 55000 cm^{-1} relative to the zero energy of said ground state; and wherein said ionizing step by the photons of the third frequency is performed by applying said photons of said third frequency to ionize atoms in said second excited state at an energy of 42049.0 cm^{-1} to continuum states at an energy range of 49266.7 cm^{-1} ~ 55000 cm^{-1} relative to the zero energy of said ground state

because isotopes are characterized by having distinctly excitable absorption states or resonance absorption lines separated by a small amount called an isotopic shift. The lines are sufficiently precise, however, they can be selectively excited by employing radiation of a suitable narrow band source, such as provided by a laser or other narrow line width source. A flash lamp or tunable laser is energized to irradiate a given volume with photons having an energy range encompassing an isotope species so that the species in the volume becomes excited at its resonance line.

The energy is a result-effective variable and one skilled in the art has the skill to calculate the energy that would have determined the success of the desired reaction to occur, i.e., encompassing an isotope species so that the species in the volume becomes excited at its resonance line (MPEP § 2141.03).

Furthermore, the energy appears to be a mere optimization which solves no stated problems and produces no unexpected results, unless proven otherwise (MPEP § 2144.05 (II)).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edna Wong whose telephone number is (571) 272-1349. The examiner can normally be reached on Mon-Fri 7:30 am to 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Edna Wong
Primary Examiner
Art Unit 1753

EW
July 19, 2006